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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,203	03/26/2004	Ho Yong Kang	2013P160	8669

8791 7590 08/28/2007

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EXAMINER	
KIM, DAVID S	

ART UNIT	PAPER NUMBER
2613	

MAIL DATE	DELIVERY MODE
08/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/810,203	KANG ET AL.	
	Examiner	Art Unit	
	David S. Kim	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 June 2007* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Applicant's response to the objections to the drawings in the previous Office Action (mailed on 06 March 2007) is noted and appreciated. Replacement drawings were received on 08 June 2007. These drawings are disapproved for the following reasons:

1) The connections from the peak value sensor to the error amp in Figs. 6-7 are not supported. As a simple remedy, Examiner suggests the simple removal of these connections.

2) The connections from the error amp to the output lines in Figs. 6-7 are not supported. As a simple remedy, Examiner suggests the simple removal of these connections.

2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. **Claims 5 and 9** are objected to because of the following informalities:

In claim 5, "wherein the differential signal is output" is used where -- wherein the differential signals are output -- may be intended. Otherwise, antecedent basis is inconsistent with the previous instances of plural "differential signals". Also, "a cascaded set of a plurality of auto-offset cancellation portions" is used where -- an auto-offset cancellation portion -- may be intended. Otherwise, each "set" of

the "series of sets" (in the preamble) includes multiple auto-offset cancellation portions, which is in contrast with each set having one auto-offset cancellation portion (see corresponding Fig. 5).

In claim 9, "wherein the differential signal is output" is used where -- wherein the differential signals are output -- may be intended. Otherwise, antecedent basis is inconsistent with the previous instances of plural "differential signals".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. Applicant's response to the rejections of **claims 5-7 and 9-12** under 35 U.S.C. 112 in the previous Office Action (mailed on 06 March 2007) is noted and appreciated. Applicant responded by amending these claims. Applicant's response overcomes the previous rejections, which are presently withdrawn.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. **Claims 1 and 3-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono (U.S. Patent Application Publication No. US 2002/0109075 A1) in view of Ide et al. (U.S. Patent No. 5,955,921, hereinafter "Ide").

Regarding claim 1, Ono discloses:

A burst mode optical receiver (e.g., Fig. 41) comprising:

a photodiode which converts an input optical signal into a current signal (PD);

a pre-amplifier which converts the current signal into a voltage signal (IV);

a single-to-differential converter which converts the single voltage signal output from the pre-amplifier into differential signals (AMP);

a post amplifier which amplifies the differential signals and cancels an offset occurring during the amplification or offsets inherited from the differential signals (DAMP and VOS); and

a discriminator which discriminates data from the differential signals (CMP).

Ono does not expressly disclose:

a single-to-differential converter which converts the single voltage signal output from the pre-amplifier into differential signals wherein the single-to-differential converter comprises a differential amplifier which receives a predetermined reference voltage as a first input and the single voltage signal as a second input to output symmetrical differential signals.

However, such a structure is known in the art, as shown by the automatic threshold control (ATC) circuit of Ide (Fig. 30). At the time the invention was made, it would have been obvious to one of ordinary skill in the art to include an ATC circuit in the single-to-differential converter of Ono. One of ordinary skill in the art would have been motivated to do this to provide a wide dynamic range (Ide, col. 2, l. 25-26), which enables the receiver of Ono to follow variations in the level of the input signal (Ide, col. 2, l. 20-24).

Regarding claim 3, Ono in view of Ide discloses:

The burst mode optical receiver of claim 2, wherein the single-to-differential converter further comprises an auto threshold controller (Ide, 102 in Fig. 30) which detects maximum and minimum levels (Ide, peak and bottom detecting circuits) of the single voltage signal and provides a substantial middle value of the maximum and minimum levels as a first input to the differential amplifier (Ide, "intermediate value" in col. 2, l. 4-9).

Regarding claim 4, Ono in view of Ide discloses:

The burst mode optical receiver of claim 3, wherein the auto threshold controller comprises:

a top holder which detects the maximum level of the single voltage signal and holds the maximum level for a predetermined period of time (Ide, peak detecting circuit in Fig. 30);

a bottom holder which detects the minimum level of the single voltage signal and holds the minimum level for a predetermined period of time (Ide, bottom detecting circuit in Fig. 30); and

a voltage divider which detects the substantial middle value of the maximum and the minimum levels (Ide, voltage dividing circuit in Fig. 30).

8. **Claims 5-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono in view of Ide, as applied to claim 1 above, and further in view of Hatakeyama et al. (U.S. Patent No. 6,018,407, hereinafter "Hatakeyama").

Regarding claim 5, Ono in view of Ide does not expressly disclose:

The burst mode optical receiver of claim 1, wherein the post amplifier comprises a series of sets, each of the sets comprising:

a limiting amplifier which amplifies the differential signals and cancels offsets inherited from the differential signals or an offset occurring during the amplification according to a predetermined control signal wherein the differential signal is output from the single-to-differential converter for the first set and output from the limiting amplifier of the previous set for the subsequent sets; and

a cascaded set of a plurality of auto-offset cancellation portions which calculates a difference between outputs of the limiting amplifier, amplifies the difference, and provides the amplification result as the predetermined control signal to the limiting amplifier.

However, such a structure is known in the art, as shown by the offset compensating amplifying circuits of Hatakeyama (e.g., amplifiers after PRE in Fig. 7). At the time the invention was made, it would have been obvious to one of ordinary skill in the art to such offset compensating teachings in the post amplifier of Ono in view of Ide. One of ordinary skill in the art would have been motivated to do this since doing so would compensate (Hatakeyama, col. 1, l. l. 48-51) the offset from differential amplifiers/signals, such as the differential amplifier(s)/signals of Ono (Ono, DAMP in Fig. 41) in view of Ide.

Regarding claim 6, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 5, wherein the limiting amplifier is a differential amplifier (Hatakeyama, notice the positive-phase and negative-phase output signals from limiter amplifiers LIM) that operates in a linear region (amplifiers commonly operate in a linear region).

Regarding claim 7, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 6, wherein the auto-offset cancellation portions comprises:

a peak value sensor which detects the maximum or minimum levels from the outputs of the limiting amplifier (e.g., Hatakeyama, PD(1)P or PD(1)N in Fig. 7); and

an error amplifier which amplifies the difference between the maximum or minimum levels (e.g., Hatakeyama, AMP(1) in Fig. 7).

Regarding claim 8, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 5, wherein the auto-offset cancellation portions comprises:

a peak value sensor which detects the maximum or minimum levels from the outputs of the limiting amplifier (e.g., Hatakeyama, PD(1)P or PD(1)N in Fig. 7); and

an error amplifier which amplifies the difference between the maximum or minimum levels (e.g., Hatakeyama, AMP(1) in Fig. 7).

Regarding claim 9, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 1, wherein the post amplifier comprises cascaded sets, each of the sets comprising:

a first limiting amplifier (e.g., Hatakeyama, LIM(1) in Fig. 7) which amplifies the differential signals output from the single-to-differential converter and cancels the offsets inherited from the differential signals or the offset occurring during the amplification according to the predetermined control signal (Hatakeyama, offset compensation in LIM(1));

an auto offset cancellation portion (e.g., Hatakeyama, PD(1)P and PD(1)N and AMP(1) and summers in Fig. 7) which calculates a difference between the outputs of the first limiting amplifier,

amplifies the difference (Hatakeyama, AMP(1)), and provides the amplification result as the predetermined control signal to the first limiting amplifier (Hatakeyama, summers); and

a second limiting amplifier (e.g., Hatakeyama, LIM(2)) which amplifies differential signals output from the first limiting amplifier; and

wherein the differential signal is output from the single-to-differential converter for the first set (LIM(1) of Fig. 7 of Hatakeyama after AMP of Fig. 41 of Ono) and output from the second limiting amplifier of the previous set for the subsequent sets (e.g., LIM(3) of Fig. 7 of Hatakeyama after LIM(2) of Fig. 7 of Hatakeyama).

Regarding claim 10, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 9, wherein the first or second limiting amplifier is a differential amplifier (Hatakeyama, notice the positive-phase and negative-phase output signals from limiter amplifiers LIM) that operates in a linear region (amplifiers commonly operate in a linear region).

Regarding claim 11, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 10, wherein the auto-offset cancellation portion comprises:

a peak value sensor which detects the maximum and minimum levels from the outputs of the first limiting amplifier (e.g., Hatakeyama, PD(1)P or PD(1)N in Fig. 7); and

an error amplifier which amplifies a difference between the maximum and minimum levels (e.g., Hatakeyama, AMP(1) in Fig. 7).

Regarding claim 12, Ono in view of Ide and Hatakeyama discloses:

The burst mode optical receiver of claim 9, wherein the auto-offset cancellation portion comprises:

a peak value sensor which detects the maximum and minimum levels from the outputs of the first limiting amplifier (e.g., Hatakeyama, PD(1)P or PD(1)N in Fig. 7); and

an error amplifier which amplifies a difference between the maximum and minimum levels (e.g., Hatakeyama, AMP(1) in Fig. 7).

Response to Arguments

9. Applicant's arguments filed on 08 June 2007 have been fully considered but they are not persuasive. Applicant presents two salient points.

Regarding the first point, Applicant states:

> "Claims 2-4 are rejected under 35 U.S.C § 103(a) as being unpatentable over Ono in view of Ide et al. (U.S. Patent No. 5,955,921). In addition, Claims 5-12 are rejected under 35 U.S.C § 103(a) as being unpatentable over Ono in view of Hatakeyama et al. (U.S. Patent No. 6,018,407). In response, Ono teaches a DC offset cancellation circuit that is capable of cancelling a DC offset voltage while preventing a signal waveform from being distorted due to accumulation of AC components. It accomplishes handling of a wide range of optical signals by using a differential pre amplifier and adapting the rest of the circuit to match this. The Examiner relies on the Automatic Threshold Control (ATC) circuit of Ide as shown in Figure 30 to provide this teaching. However, the ATC of Ide requires a single non-differential voltage signal (Input) as input while the Ono pre-amplifier produces a differential voltage signal output. Thus, the Ono preamplifier circuit cannot be used as the input to the subsequent Ide's automatic threshold control. This would mean that it would require a 'substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which [the primary reference] construction was designed to operate'. Thus, according to MPEP 2143.01(VI) Ono and Ide cannot be combined to support a rejection under 35 USC 103" (REMARKS, p. 6-7, bridging paragraph).

Notice that Applicant characterizes AMP in Fig. 41 of Ono as the "pre-amplifier" of Applicant's claims. However, Examiner respectfully notes that the standing rejections actually identify IV in Fig. 41 of Ono as the "pre-amplifier" of Applicant's claims. According to Fig. 41, "pre-amplifier" IV of Ono produces a single non-differential voltage signal V1. As the ATC of Ide takes a single non-differential voltage signal (INPUT in Fig. 30 of Ide) as input, it follows that the Ono "pre-amplifier" IV can be use as the input to the subsequent Ide's automatic threshold control. This means that it would not require a 'substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which [the primary reference] construction was designed to operate'. Accordingly, this point is not persuasive.

Regarding the second point, Applicant states:

> "Furthermore, regarding the rejection of claims 2-4, there is no motivation to combine Ono with Ide. The Examiner states that 'wide dynamic range' is the motivation to combine. But, according to MPEP 2143.01(III), 'the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.' However, as noted by the Examiner, Ono does not disclose the burst mode optical receiver of claim 2, wherein the single-to-differential converter comprises a differential amplifier which receives a predetermined reference voltage as a first input and the single voltage signal as a second input to output symmetrical differential signals. Ono does not teach or suggest an automatic threshold circuit of any type. Although Ide does teach an ATC circuit, as noted at

> column 2 beginning at line 22, although when an input level of the signal is varied, the threshold value can be varied which makes it possible to obtain a good output wave form over a wide dynamic range. However, the threshold level output from the ATC circuit deviates from an original threshold level set by an offset value. Figure 30 of Ide, which is the prior art, is provided to show the problem which exists with the prior art circuit. Thus, while Ide teaches that it is desireable to obtain a good output wave form over a wide dynamic range, a person skilled in the art would not be led to use this circuit in combination with Ono due to the problems raised by Ide" (REMARKS, p. 7-8, bridging paragraph).

Examiner respectfully notes that Applicant's concern about this offset value deviation is mitigated by the fact that the circuit of Ono already includes a suitable means for compensating offsets, i.e., offset voltage VOS in Fig. 30 of Ono. Therefore, Applicant's concern about this offset value deviation does not present a persuasive argument that would overcome the motivation from Ide of providing a wide dynamic range (Ide, col. 2, l. 25-26), which enables the receiver of Ono to follow variations in the level of the input signal (Ide, col. 2, l. 20-24). Accordingly, this point is not persuasive.

Summarily, Applicant's arguments are not persuasive. Accordingly, Examiner respectfully maintains the standing rejections.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Kim whose telephone number is 571-272-3033. The examiner can normally be reached on Mon.-Fri. 9 AM to 5 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth N. Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSK

VANDERPUYE
SUPERVISORY PATENT EXAMINER

Disapproved by DSK
21 August 2007

FIG. 5

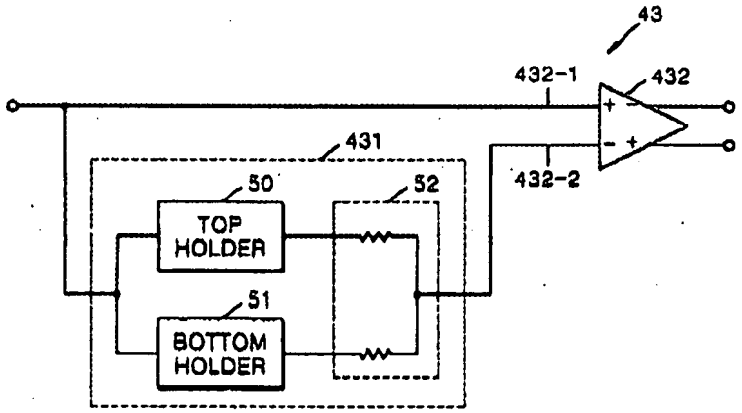
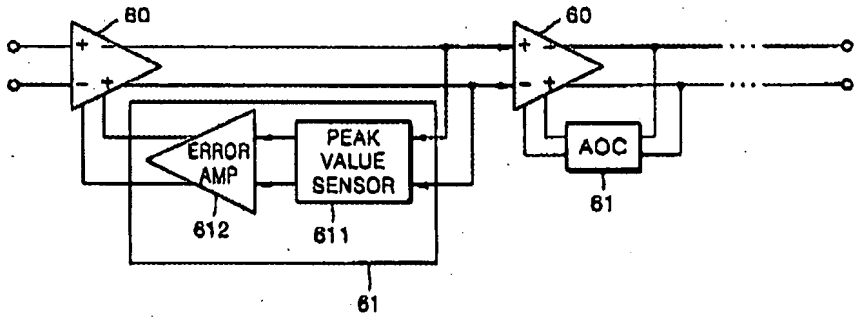


FIG. 6



Disapproved by DSK
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FIG. 7